

Multiple Beams and Nozzles to Increase Deposition Rate

Abstract: A method has been developed to exploit the desirable material and process characteristics provided by a low powered laser material deposition system, while overcoming the low material deposition rate imposed by the same process. One application of particular importance for this invention is direct fabrication of functional, solid objects from a CAD solid model. This method of fabrication uses a software interpreter to electronically slice the CAD model into thin horizontal layers that are subsequently used to drive the deposition apparatus. The apparatus uses a single laser beam to outline the features of the solid object and then uses a series of equally spaced laser beams to quickly fill in the featureless regions. Using the lower powered laser provides the ability to create a part that is very accurate, with material properties that meet or exceed that of a conventionally processed and annealed specimen of similar composition. At the same time, using the multiple laser beams to fill in the featureless areas allows the fabrication process time to be significantly reduced.